

NON-RESIDENT COURSE.

COLLEGE

OF

PHYSICIANS AND SURGEONS,

CHICAGO.

DIRECTIONS FOR STUDENTS.

BIOLOGY.

NOTE.—This paper is to be preserved, as it will contain matter which will be omitted from succeeding monthly announcements.

I. Read carefully the announcement explanatory of the purpose of the course, and refer anything not clear to your preceptor or to Dr. Bayard Holmes, 240 Wabash ave., Chicago.

II. Provide yourself with the following apparatus. (See Huxley and Martin, PRACTICAL BIOLOGY, pages 482-498):

(1). Two scalpels, straight-backed blades, different sizes.

(2). One pair of small $3\frac{1}{2}$ -4 inch scissors with sharp points, cutting edge about $\frac{3}{4}$ -inch, handles meeting when scissors are closed.

For coarser work a common scissors may be used.

(3). Two pairs straight dissecting forceps, large and small. See that points meet accurately.

(4). Blowpipe. A cheap one may be bought for 15c. or you may make what will answer your purpose from a piece of glass tubing, by heating middle of tube over a flame and when glass is soft drawing it out to a fine point and breaking off. Your preceptor will show you how it is done.

(5). One or two camel's hair brushes.

(6). Six needles, in holders, which student may make by shoving the needle, head first, into a common pine pen-holder.

(7). Oblong tin dish ($8 \times 4 \times \frac{3}{4}$ in.) Half fill this with mixture of paraffin and lampblack. The paraffin may be procured at drug store, and is to be melted before lampblack is added. It is then poured into the tin dissecting dish.

(8). A hand magnifying glass, or simple dissecting microscope mounted on a stand.

[While not essential to the purposes of the present course, the student is advised to use, wherever practicable, a compound microscope with low and high power objectives. Students possessing microscopes will find useful directions as to care and method of using the instrument, hardening, embedding, section cutting, and mounting, in the pages above mentioned, and in the "Laboratory Work" in the same book. Get a few hints, if possible, from some one who knows how to use a microscope.]

(9). A one-ounce syringe of metal or glass and two or three half-ounce medicine droppers, with their points drawn out to varying degrees of fineness, for coarse injection for anatomical purposes.

N.M.J.

While the metal syringe is perhaps preferable when injection for histological study is to be made, the common glass syringe will answer the student's purposes in this course. Follow out carefully instructions given in Huxley & Martin, pp. 485, 486.

(10). Drawing paper, H and HB pencils ; red, blue and yellow colors (preferably moist) ; one or two brushes.

[A drawing paper which will answer sufficiently well is "drawing manila," which may be bought at stores keeping artists' materials for eight or ten cents a yard. The proprietor will, on application, give necessary hints on the use of the colors. See also under III, (4). If drawing paper is not readily procurable, the sketches may be made on any white unruled paper at hand. To take color, however, it should not have a hard finish].

III. (1). Procure a number of crayfish and clams. Frogs may be secured next month. The crayfish will live happily enough in a tub one-quarter full of water down cellar, where their belligerent tendencies and other peculiarities may be noted. See what these are. Frogs and clams are more impatient of confinement, and had better be preserved in alcohol, to be used in connection with live and freshly-killed specimens in the dissections.

(2). Before dissecting, read over the general description which precedes "Laboratory Work" in Huxley & Martin. Look up words the meaning of which you do not fully understand, and take the trouble to satisfy yourself as to their derivations. This takes time, but will largely increase your knowledge of the subject. Also look up the position, in the animal kingdom, of the class to which the animal under consideration belongs. You will find this in any general work on Zoölogy, *e. g.*, Packard, Nicholson, or under the proper heading in any good encyclopædia.

(3). As a further preliminary, read carefully the directions on Dissecting. Huxley & Martin, p. 484.

(4). Make diagrams at every stage of the dissection. If preferred, one animal may first be dissected without drawing, but the succeeding ones should be drawn, in the crayfish, *e. g.*, even to the setæ on the free border of the telson. A word of encouragement will perhaps be necessary to some. Any one can draw. Make the diagrams in outline, and on a large scale. Don't be sparing of the paper. It is unnecessary to finish more than a small portion in detail, but of that small portion as accurate a representation as possible should be made, in essential particulars. For example: if you wish to represent a ciliated columnar cell, containing a nucleus, do not omit the nucleus and the hair-like process. Light flat washes will generally suffice in coloring. Always use corresponding colors for corresponding organs. Let all drawing paper be "letter size."

PHYSICS.

This course covers, as a review, the subject of matter, force, motion and gravitation, and makes a careful study of hydraulics, light and sound. One hour a day.

Ganot's Elementary Treatise on Physics is recommended for the study of the last three subjects. Appleton's School Physics will do for the review.

THE MONTH OF OCTOBER.

PHYSICS.

FIRST WEEK.

Read the preliminary chapters and study carefully (1) the general and (2) the specific properties of bodies. Notice the method of (1) recognizing and (2) measuring each.

SECOND WEEK.

Kinematics : Motion, composition of motion, parallelogram of motions resultant of several uniform motions. Representation of velocities by diagrams. Energy, inertia, various forms of energy, destructibility of energy. Force, action, line of action, recognition of force, measurement of force, units of measure, unit of energy. Work, potential energy. The British engineering unit, of work, of energy. The French or Metric Engineering System. Gravitation, measurement of force of gravitation, relative of unit to unit of length.

THIRD WEEK.

Hydrostatics. Ganot. Book III. § 95-111.

FOURTH WEEK.

Hydrostatics, continued. Bodies measured in liquids. Ganot. § 112-130.

BIOLOGY.

The dissection of the clam is to be begun and continued daily until finished. Make a drawing for each stage of the dissection. Write carefully (1) the names of the parts, (2) the date of the dissection, and (3) your own name on each paper. Send these papers to the Secretary of the

College every Saturday night. Use a large envelope. They will be marked and returned.

The time to be devoted to this study is fifteen hours a week, *i. e.*, three hours a day during five days of each week.

Do not be scrimping of paper. Put the large drawings on the middle of the sheet. A number of small drawings may be scattered over the sheet in an orderly manner.

The study of the crayfish should begin in the third week of this month. If difficulties are met, overcome them yourself, if possible. Write freely when necessary. Remember that in this work you will become familiar with a vocabulary, with methods of observation, with methods of dissection, all of which will be very useful to you in your subsequent study. The comparative anatomy which you will learn will give you a broader view. A more vivid idea of the principles of physiology will be obtained from the study of these animals than any lecturer can impart. Be patient, careful and persistent.

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